



Westinghouse
Computer Systems
Division

**PRODAC 250
COMPUTING
CONTROL
SYSTEM**

NEW

NEW P-250

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NOW - A FAST COMPUTER SYSTEM at a small controller price

Designed especially to meet the need for medium sized process control computer applications, the new Westinghouse PRODAC 250 has an ultra high speed central processor, unlimited mass storage and most significant of all, a radical new approach to process control programming.

Input/output hardware, proven in over 100 installations of PRODAC 500 and PRODAC 50 systems to be accurate, dependable and convenient is continued. This equipment is unsurpassed for noise rejection and electrical isolation, and the terminals are designed to stand up to muscular plant electricians.

NEW P-250



HARDWARE

Inside, the central processor is a completely new machine. Just check these features:

- 16 bit word length
- 1 microsecond core cycle time
- memory parity checking
- integrated circuitry
- hardware multiply and divide available
- word, byte or bit operation
- complete memory protection
- 375,000 word rapid access mass memory (more than one can be directly coupled)
- 720 kilocycle bit transfer rate
- contact status input filtered and isolated
- up to 25,000 external interrupts
- 0.1% analog to digital conversion
- mercury wetted latching relays for contact output
- magnetic tape, line printer, card reader and punch available
- programmer's console with paper tape equipment standard
- temperature operating range of 5 to 50 C
- power failure protection
- automatic restart available
- voltage tolerance of $\pm 10\%$.

PROGEN FOR CONTROL

However good the hardware of a computer for control may be, the system is no better than the programming, and the cost of programming is a function of the tools available. Now, as a major advance in the art, Westinghouse offers an integrated software package, expanding the PROGEN philosophy, with all elements designed to operate together. Only by having a compiler, computer management programs and back-up services can this advantage be obtained. The PRODAC 250 has these programming aids:

- Control compiler operating on line. Requires 4K core when used with mass memory.
- On line program debugging capability.
- Real-time, computer management programs including priority, input scans, output and programmer's console executives.
- Dynamic program relocation allowing time and space sharing.
- Sequence of operation and decision table capability in the compiler.
- Option to use written and tested Westinghouse programs as sub-routines.
- Back-up of Westinghouse Systems Laboratory for program writing, debugging and simulation.

The advent of the PRODAC 250 with its high speed operation, low cost mass storage, and new programming techniques has changed the relationship between machine language and compiler programming. Heretofore compiler programs have been too expensive in terms of the memory requirements to store and use the compiler and running times when the program was used in a real-time application.

Now, with the PRODAC 250 series, Westinghouse makes it feasible to do control programming in compiler language. The speed of the hardware and the exclusive Westinghouse PROGEN approach now makes it possible. PROGEN incorporates a compiler, real-time executive programs and special software services. The compiler is an augmented FORTRAN IV, with all the programming ease and familiarity of this language, but with important added features. Some of these include the ability to call executive programs for message writers, control of scans or outputs as well as running under the priority executives.

In addition, individual bit manipulation for decision tables, sequence of operations and the like is retained just as in machine language. Complex mathematical operations, such as performance calculations and direct digital control algorithms can be programmed quickly. After these programs have been written, there frequently is a need to change one small part of the program to obtain still higher process efficiency. Normally it is necessary to re-compile the entire program. With PROGEN, changes can be made in compiler language to that segment of the program only.

As has been the case since 1958, Westinghouse stands ready to perform whatever programming services you desire. This can mean writing, debugging and field checking all the programs in a complete system, or it can mean simply making a program change on an off-line basis. The complete services of the Systems Laboratory, which includes process simulation with digital or hybrid facilities, are part of the convenience of the PRODAC 250—the Westinghouse PROGEN philosophy.

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APPLICATIONS of the PRODAC 250

Previous computer systems generally fit into neat categories. The lowest cost systems were relatively slow and were suitable for small plants or individual portions of larger complexes. Large machines were costly and required large plants and complex control responsibility for justification. The PRODAC 250 combines the low cost with high speed to become applicable to a wide range of applications. Without the mass memory, the P-250 sells for only a little more than slower systems and can be justified where the higher speed and resulting greater computational capability are required. With the hardware multiply and the low cost mass memory, the P-250 can perform large control tasks and still have spare time for off-line operations. Some of the applications for which the P-250 is particularly well suited include:

- Power plant monitoring, alarming and performance calculations, turbine start up.
- Economic dispatch for steam, hydro or combination systems.
- Steel rolling including slabbing, hot strip, cold finishing.
- Metal production, including BOF and arc furnace where large amounts of data are to be accumulated and stored in the computer.
- Production control.
- Direct digital control of 100 or more loops or where optimizing can be combined with the control machine.
- Quality control where results are to be stored and monthly reports automatically prepared.
- Production scheduling and inventory control.
- Cement plant control including raw blending, grinding, kiln control and data logging.
- Pilot plant operation with the option of actual plant control later.
- Mineral processing plant control and data accumulation.
- Pulp and paper mill operation including digester, bleach plant and paper machine.
- Automation hierarchy systems with two or more PRODAC 50 systems feeding into one P-250.

DIMENSIONS & SPECIFICATIONS (per cabinet)

Height—87"	Depth—33"
Width—53"	Weight—1500 lbs., approximate

POWER REQUIREMENTS

Volts—120
Watts—2000 (main frame and I/O; loggers, tape drives, etc., extra)

PROGRAMMERS CONSOLE: Teletype model 35 with options for high speed tape or card equipment

CHANNELS

Buffered Channels

Number of channels: up to 28
Line printers
Output printers
Card reader and punch
Mass memory—rapid access, 45K word/second transfer rate

Direct Channel

Operator's consoles: Custom built to user's requirements
Number of channels: up to 256 for process
Contact scan: 800K points/second
Analog scan: Multiples of 40 points/second